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09/749,750	12/28/2000	Subramaniam J. Maiyuran	2207/10608	5565

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EXAMINER

ELMORE, STEPHEN C

ART UNIT

PAPER NUMBER

2186

DATE MAILED: 07/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/749,750

Applicant(s)

MAIYURAN ET AL.

Examiner

Stephen Elmore

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) 1-5, 36 and 37 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 7-19 and 21-35 is/are allowed.
- 6) ☒ Claim(s) 6 and 20 is/are rejected.
- 7) ☒ Claim(s) 19 and 23 is/are objected to.
- 8) ☒ Claim(s) 1-5, 36 and 37 are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 December 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

1. Claims 1-37 have been presented for examination.

Election/Restrictions

2. Restriction to one of the following inventions is required under 35 U.S.C. 121:
 - I. Claims 1-5, 36 and 37, drawn to an associative cache, classified in class 711, subclass 128.
 - II. Claims 6-19 and 20-35, drawn to a power control and cache control method, classified in class 711, subclass 154.
3. The inventions are distinct, each from the other because of the following reasons:
 - a. Inventions I and II are related as subcombinations disclosed as usable together in a single combination. The subcombinations are distinct from each other if they are shown to be separately usable. In the instant case, invention I has separate utility such as an associative cache apparatus for use in a computer system, and invention II has separate utility such as a power or cache control method for use in a computer system. See MPEP § 806.05(d).
 - b. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.
 - c. Because these inventions are distinct for the reasons given above and have acquired a separate status in the art because of their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

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d. Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, and the search required for Group II is not required for Group I, restriction for examination purposes as indicated is proper.

4. During a telephone conversation with applicant's representative Robert Hails, Reg. No. 39,702, on July 11, 2003 a provisional election was made without traverse to prosecute the invention of Group II, claims 6-35.

5. Affirmation of this election must be made by applicant in replying to this Office action.

6. Claims 1-5, 36 and 37 are withdrawn from further consideration by the examiner, 37 CFR § 1.142(b), as being drawn to a non-elected invention.

7. Claims 6-35 remain for examination.

Drawings

8. Figure 5 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). More specifically,

a. Figure 5 is described in the Brief Description of the Drawings as "a block diagram illustrating cache organization according to conventional techniques"; and,

b. in the discussion of Figure 5 in the Detailed Description, see pages 12 and 13, the figure's description does not include or address any novel features of the instant invention; therefore, it is determined that Figure 5 only represents Prior Art.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

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9. The drawings are objected to because of the following informalities:

a. Fig. 1 is missing necessary labeled inputs and outputs that assist in identifying and understanding process functionalities related to the decoder (input), and tag, data, and stage fields (outputs) of WAY 0; and,

b. Figs. 5 and 6 also fail to provide a labeled input to the address decoders.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

10. The drawings are objected to as failing to comply with 37 CFR § 1.84(p)(5) because they include the following reference sign(s), or labels, not mentioned in the description:

a. Fig. 2 -- "HT", "E State" and "G2S";

b. Fig. 3 -- "HT", "E State", "G2S" and "RFO";

c. Fig. 6 -- "L".

A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

11. The abstract of the disclosure is objected to because:

a. in lines 9-11, there exists non-idiomatic English in the language "contributes reduces the power".

Correction is required. See MPEP § 608.01(b).

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12. The disclosure is objected to because of the following informalities:

a. on page 9, lines 9-10, in the language *"If a cache miss occurs, the cache manager 180 may determine from the state information of a victim way (identified by the LRU 170)."*, the cache manager determines something, however, this language is incomplete because it does not identify what it is that the cache manager "determines".

Appropriate correction is required.

Claim Objections

13. Claims 19 and 23 are objected to because of the following informalities:

a. claim 19 terminates in incorrect punctuation, it should terminate in a "period";

b. claim 23, line 3, the term "disable" is grammatically incorrect, it should be "disabled".

Appropriate correction is required.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

15. Claims 6 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Albonesi, "Selective Cache Ways: On-Demand Cache Resource Allocation," November 1999.

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Albonesi teaches the claimed power and cache control method in an integrated circuit, (claims 6 and 20) as a system to disable a subset of the ways in a set associative cache of a processor to save energy or power, see Abstract and Figure 1, comprising:

As to claim 6,

a. *in response to a microinstruction, disabling predetermined modules within an internal cache* is taught, see page 249, col. 2, and page 250, Section 3. **Selective Cache Ways**, and Section 3.1. **Hardware Organization**, and also see Fig. 1, where the feature "microinstruction" is equivalent to the functionality of the special instructions WRCWSR and RDCWSR, page 250, and where the feature "predetermined modules" is taught as "(disabling the operation of) particular ways", page 250, col. 2, first and second lines, and the internal cache is taught as the 4-way set associative cache shown in Figure 1, where also, predetermined modules are particular ways of data ways 0-3;

As to claim 20,

b. *in response to a data request, generating at least one microinstruction within a cache, disabling predetermined portions of the cache based on the microinstruction* is taught, see page 249, col. 2, and page 250, Section 3. **Selective Cache Ways**, and Section 3.1. **Hardware Organization**, and also see Fig. 1, where the feature "microinstruction" is equivalent to the functionality of the special instructions WRCWSR and RDCWSR, page 250, and where the feature "predetermined portions of the cache" is taught as "(disabling the operation of) particular ways", page 250, col. 2, first and second lines, and the internal cache is taught as the 4-way set associative cache shown in Figure 1, where also, predetermined portions of the cache are particular ways of data ways 0-3, and further, where it is inherent to the well-known process of

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accessing a processor cache by the processor requesting data, which may be either a data read or a data write, and through the functionality of the cache controller, it is necessarily inherent that access to any way, i.e., way 0 - way 3, occurs as a result of a data request, for example, from a processor to access data being held or stored in that way of an associative cache.

Allowable Subject Matter

16. Claims 7-19 and 21-35 appear allowable over the prior art of record, however, applicant is reminded that claims 19 and 23 remain objected-to as noted above.

Conclusion

17. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Elmore whose telephone number is (703) 308-6256. The examiner can normally be reached on Mon-Fri from 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim can be reached on (703) 305-3821. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 746-7239 for regular communications, (703) 746-7240 for Non-Official/Draft communications, and (703) 746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.



Stephen Elmore
Patent Examiner
Art Unit 2186
July 11, 2003